

Appl. No.: 10/620,186

Supplemental Amdt. dated: July 21, 2006

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A process for the production of propylene from a C₄ olefin stream containing n-butenes, isobutylene and paraffins comprising the steps of:
 - a. passing said C₄ olefin stream in contact with a metathesis catalyst whereby autometathesis occurs including the reaction of isobutylene with n-butenes and an autometathesis product is produced containing ethylene and propylene and heavier olefins including unreacted isobutylene and paraffins;
 - b. fractionating said autometathesis product to remove an ethylene stream leaving a deethyleneized stream of said propylene and said heavier olefins and paraffins;
 - c. fractionating said deethyleneized stream to remove propylene product leaving a depropyleneized stream of said heavier olefins and paraffins;
 - d. processing said depropyleneized stream to remove isobutylene leaving a remaining C₄ and heavier olefins stream also containing paraffins;
 - e. purging a portion of said remaining C₄ and heavier olefins stream to limit paraffin buildup;
 - f. admixing the remaining portion of said remaining C₄ and heavier olefins stream with a quantity of ethylene sufficient for conventional metathesis wherein said quantity of ethylene comprises said removed ethylene stream and an amount of external fresh ethylene selected such that the molar ratio of said external fresh ethylene to the n-butenes in said C₄ olefin stream is from zero to 0.8; and

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g. passing said admixture in contact with a metathesis catalyst and thereby producing a conventional metathesis product containing additional propylene.

2. (Previously Presented) A process as recited in claim 1 wherein said conventional metathesis product is combined with and fractionated with said autometathesis product.

3. (Previously Presented) A process as recited in claim 1 wherein said step d of removing isobutylene comprises a catalytic distillation hydroisomerization de-isobutyleneizer process wherein 1-butene is converted to 2-butene.

4. (Previously Presented) A process as recited in claim 1 wherein said C₄ olefin stream additionally contains butadiene limited to a level of less than 10,000 ppm.

5. (Previously Presented) A process as recited in claim 4 wherein said butadiene level is limited to a level of less than 500 ppm.

6. (Previously Presented) A process as recited in claim 1 where the autometathesis catalyst consists of a group VIA or VIIA metal oxide either supported or unsupported.

7. (Previously Presented) A process of claim 6 where the autometathesis catalyst is tungsten oxide on silica.

8. (Previously Presented) A process of claim 6 where the autometathesis catalyst is admixed with a Group IIA basic metal oxide double bond isomerization catalyst.

9. (Previously Presented) A process of claim 8 where the double bond isomerization catalyst is magnesium oxide.

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10. (Previously Presented) A process as recited in claim 1 where the conventional metathesis catalyst consists of a group VIA or VIIA metal oxide either supported or unsupported.

11. (Previously Presented) A process of claim 10 where the conventional metathesis catalyst is tungsten oxide on silica.

12. (Previously Presented) A process of claim 10 where the conventional metathesis catalyst is admixed with a Group IIA basic metal oxide double bond isomerization catalyst.

13. (Previously Presented) A process of claim 12 where the double bond isomerization catalyst is magnesium oxide.

14. (Previously Presented) A process of claim 10 where the conventional metathesis catalyst is formulated to have both the metathesis reaction function and a double bond isomerization function.

15. (Currently Amended) A process for the production of propylene from a C₄ olefin stream containing n-butenes, isobutylene and paraffins comprising the steps of:

a. passing said C₄ olefin stream in contact with a metathesis catalyst whereby autometathesis occurs including the reaction of isobutylene with n-butenes and an autometathesis product is produced containing ethylene and propylene and heavier olefins including unreacted isobutylene and paraffins;

b. fractionating said autometathesis product to remove an ethylene stream leaving a deethyleneized stream of said propylene and said heavier olefins and paraffins;

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- c. fractionating said deethyleneized stream to remove propylene product leaving a depropyleneized stream of said heavier olefins and paraffins;
- d. processing said depropyleneized stream to remove the C₅ + fraction leaving a mixed C₄ stream.
- e. processing said mixed C₄ stream to remove the isobutylene leaving a remaining normal C₄ olefins stream also containing paraffins;
- f. purging a portion of said remaining normal C₄ olefins stream to limit paraffin buildup;
- g. admixing the remaining portion of said remaining C₄ olefins stream with a quantity of ethylene sufficient for conventional metathesis wherein said quantity of ethylene comprises said removed ethylene stream and an amount of external fresh ethylene selected such that the molar ratio of said external fresh ethylene to the n-butenes in said C₄ olefin stream is from zero to 0.8; and
- h. passing said admixture in contact with a metathesis catalyst and thereby producing a conventional metathesis product containing additional propylene.

16. (Previously Presented) A process as recited in claim 15 wherein said conventional metathesis product is combined with and fractionated with said autometathesis product.

17. (Previously Presented) A process as recited in claim 15 wherein said step e of removing isobutylene comprises a catalytic distillation hydroisomerization de-isobutyleneizer process wherein 1-butene is converted to 2-butene.

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18. (Previously Presented) A process of claim 15 where the composition of said C₄ olefin stream is such that the ratio of 2-butene to the sum of 1-butene and isobutylene is 0.5 to 1.5.

19. (Previously Presented) A process as recited in claim 1, wherein at least half of the isobutylene is reacted with n-butenes during autometathesis.

20. (Currently Amended) A process as recited in claim 1, wherein, in autometathesis, the selectivity of propylene propylenes from the n-butenes is at least about 75%.

21. (New) A process as recited in claim 15, wherein at least half of the isobutylene is reacted with n-butenes during autometathesis.

22. (New) A process as recited in claim 15, wherein, in autometathesis, the selectivity of propylene from the n-butenes is at least about 75%.